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**United States Patent** [19]

Antonucci et al.

[11] **Patent Number:** 5,756,560[45] **Date of Patent:** \*May 26, 1998[54] **METHOD AND COMPOSITION FOR PROMOTING IMPROVED ADHESION TO SUBSTRATES**[75] **Inventors:** Joseph M. Antonucci, Kensington; Patricia A. Bennett, Germantown, both of Md.[73] **Assignee:** The United States of America as represented by the Secretary of the Commerce, Washington, D.C.[\*] **Notice:** The term of this patent shall not extend beyond the expiration date of Pat. No. 5,498,643.[21] **Appl. No.:** 562,904[22] **Filed:** Nov. 27, 1995**Related U.S. Application Data**[62] **Division of Ser. No.** 189,709, Feb. 1, 1994, Pat. No. 5,498,643.[51] **Int. Cl.<sup>6</sup>** ..... A61K 7/24; A61K 7/16; A61C 13/23; C08F 20/26[52] **U.S. Cl.** ..... 523/118; 424/49; 424/55; 433/216; 106/35; 526/320[58] **Field of Search** ..... 523/118; 424/49, 424/55; 433/216; 106/35; 526/320[56] **References Cited****U.S. PATENT DOCUMENTS**

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An etchant/primer composition is provided which includes (a) a compound having the formula

wherein  $\text{R}=\text{R}^1$  or  $\text{R}^2$ ; $\text{R}^1$ =an aromatic group; $\text{R}^2$ =a conjugated aliphatic group; $\text{Y}$ =a single bond,  $\text{CH}_2$ ,  $\text{CHCH}_3$  or  $\text{C}=\text{CH}_2$ ; and

each M is independently H, an alkali metal, an alkaline earth metal, aluminum, a transition or redox metal or an alkyl group having 1 to 18 carbon atoms, with the proviso that when both M groups are alkyl groups, the compound corresponding to formula I be capable of being easily hydrolyzed, displaced or exchanged with other reagents present in the etchant/primer composition and (b) a polar solvent system. An etchant/primer/adhesive monomer composition is also provided which includes the etchant/primer composition and an adhesive monomer system. One and two step simplified methods for adhering and for preparing a substrate surface, such as a dental substrate surface, to a polymeric material are also provided. Kits which may be used with these compositions and methods are also provided.

**15 Claims, 3 Drawing Sheets**